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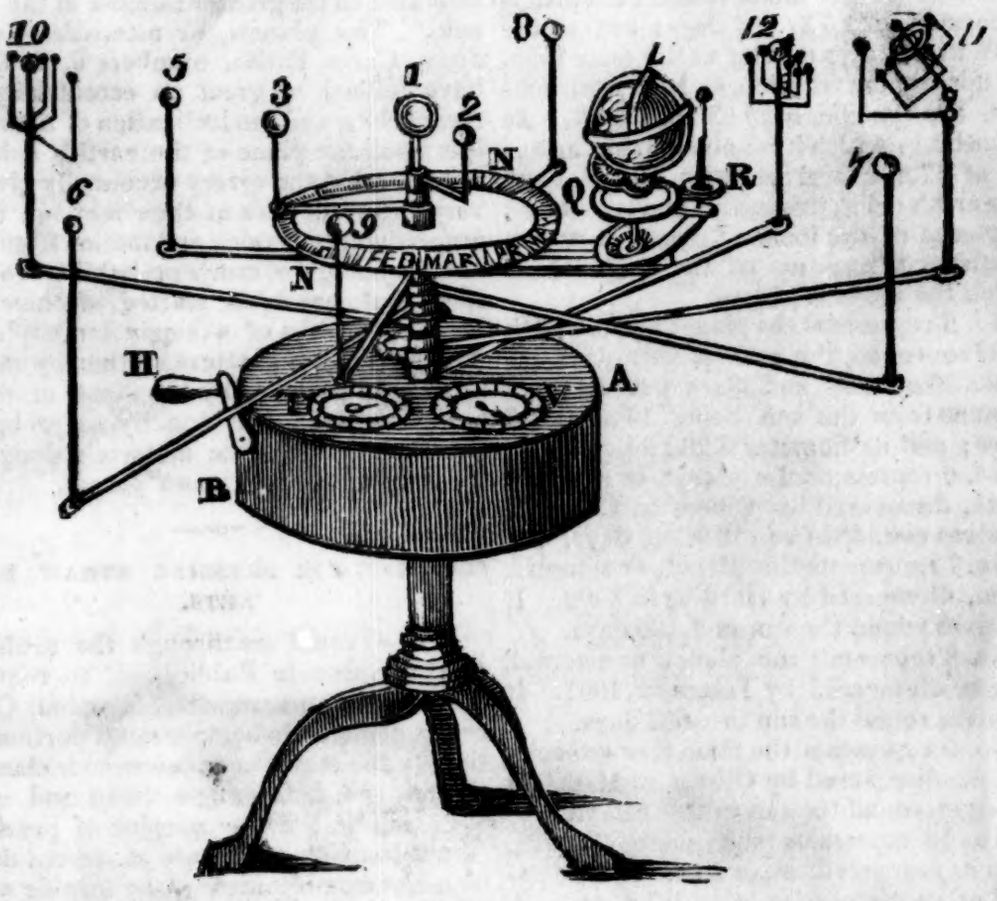
Then let each man observe with care
The wonders wrought by man's weak hand;
Nor let our scorn the worthless spare,
Who ne'er such wonders understand.
Of highest genius 'tis the pride
To comprehend what Art has done,
To know the law her steps that guide,
And share the glories she has won.

From the German of Schiller.

DESCRIPTION OF AN ORRERY.



Amongst the philosophical instruments of the present day, there is perhaps none more interesting or beautiful than the Orrery, or Planetary Machine, which is calculated to explain the motions and periods of the heavenly bodies round the sun.

We have presented our readers with a perspective view of one of these machines, which is of a portable nature. The combination of wheel-work for producing the various movements of rotation of the planets, is contained in the circular brass box, A, B, which is mounted upon a pillar, and supported by a small brass tripod. The horizontal arms, which serve as radii, to carry the planets at their extremities, are each fixed upon a separate brass tube, passing one through the other, in the manner of the slides of a telescope. A register of the number of revolutions, and fractions of a revolution, is kept by the hands on the dials, T and V.

The sun is represented by the ball, numbered 1, in the centre.

No. 2 represents the planet Mercury.

which revolves round the sun in 87 days, 23 hours, 15 minutes, and 44 seconds; its mean distance from the sun being 36,774, 320 miles, and its diameter 3130 miles.

No. 3 represents the planet Venus, which revolves round the sun in 224 days, 16 hours, 49 minutes and 10 seconds; its mean distance from the sun being 68,716, 569 miles, and its diameter 7,700 miles.

No. 4 represents the earth, on which we live, with its attendant satellite, the moon. The period of its revolution, which forms what we call a year, is 365 days, 6 hours, 9 minutes, and 12 seconds; its mean distance from the sun is 95,000,000 miles, and its diameter 7914 miles. The relative situation of the sun and earth is accurately marked by the circular zodiac, NN. The revolution of the moon round the earth is performed in 2,732,166 days; but as the earth itself keeps moving at the same time, the apparent revolution, called by astronomers the synodic, is 29,538,058 days. As the orbit in which it revolves makes an angle of 57,222 degrees with the plane of the earth's orbit, this inclination is imitated by means of the inclined plane, R, which regulates the motion of the stem, Q, on which the moon is placed.

No. 5 represents the planet Mars, which revolves round the sun in 686 days, 23 hours, 30 minutes, and 39 seconds; its mean distance from the sun being 144,760,806 miles; and its diameter 4,200 miles.

No. 6 represents the planet, or asteroid, Vesta, discovered by Olbers in 1807. It revolves round the sun in 1 335 days.

No. 7 represents the planet, or asteroid, Juno, discovered by Harding in 1803. It revolves round the sun in 1,590 days.

No. 8 represents the planet, or asteroid, Ceres, discovered by Piazza in 1801. It revolves round the sun in ,681 days.

No. 9 represents the planet, or asteroid, Pallas, discovered by Olbers in 1802. It revolves round the sun in 1,681 days.

No. 10 represents the planet Jupiter, with its four satellites, or moons. The period of its revolution round the sun is 4, 332 days, 14 hours, 19 minutes; its mean distance from the sun being 494,265,155 miles, and its own diameter 91,000 miles.

No. 11 represents the planet Saturn, with its double ring and seven satellites, or moons. The period of its revolution round the sun is 10,758 days, 23 hours, and 17 minutes; its mean distance from the sun being 966,180,000 miles, and its own diameter 77,680 miles. The breadth of the ring, and its distance from the body of the planet, are each equal to about one third of the diameter of the planet: the inclination of the ring, and of six of its satellites, to the plane of the earth's orbit, is no less than 35.8 degeees; the seventh satellite has a sensibly different inclination.

No. 12 represents the planet called Herschel, Uranus, or the Georgium Sidus, with its six satellites or moons. The period of its revolution round the sun is 30, 688 days, 17 hours, and 6 minutes; its mean distance from the sun being 1,822, 413,975 miles, and its own diameter 34,170 miles. The orbits of its satellites are remarkable for being perpendicular to the plane of its own orbit.

The orbits of the planets are indeed circular in this instrument, and elliptical in the heavens; but the difference is not considerable in the greater number of the planets. The planets, or asteroids, Vesta, Juno, Ceres, Pallas, numbers 6, 7, 8, 9, have indeed so great an eccentricity in their orbits, and the inclination of their orbits upon the plane of the earth's orbit is so great, that the orrery necessarily gives a very incorrect idea of their motion; they are so different in size and motion from the rest, as to give much probability to the idea that has been started, of their being the wrecks of a single large planet which has been shattered either by an internal explosion, or by the shock of some foreign body. It is equally as probable that they are chaotic materials designed for the formation of a new planet.

MACHINE FOR PRESSING STRAW BONNETS.

SIR,—Permit me through the medium of your valuable Publication, to request one of your numerous and ingenious Correspondents to dedicate a small portion of time to the service of a numerous class of the fair sex, in forming a cheap and useful machine for the purpose of pressing Straw Bonnets, which are at present done by a common ironing-box, by leaning with their whole weight upon their side, which is at all times a very hard and laborious employment, and often causes violent pains of the side, and sometimes produces more serious consequences. If some simple machine were invented, and a sketch inserted in your excellent Magazine, it would confer a lasting obligation upon a large portion of the fair, and I ensure their eternal gratitude.

I am, Sir,

Your humble servant,

W. C—R.

CHINESE PAINTS.

The peculiar beauty of the Chinese drawings is owing, not to the particular nature of the colouring substances, but merely to their preparation, and to their being mixed with *glue* or *size*, instead of *gum-water*, as is the common practice in Europe.

In regard to the preparation, two things must be observed; first, that the beauty of the colour depends, in a very great measure, upon the fineness of its particles, the finest being always the most beautiful. A Chinese painter often employs a man for three or four days to grind a small quantity of vermilion in a porcelain mortar, and it is from this they derive their fine reds. It is, therefore, necessary to levigate the paints to a very great degree of subtilty, in order to let them acquire the *utmost degree of beauty* of which they are capable; and it must not be imagined, that because they seem to be exceedingly fine to the touch, they may not be improved by farther grinding.

Secondly, it must be considered, that most mineral colours are prepared with acids, alkalies, or other salts, and that a small superabundance of those saline substances, generally remains with them, which, after a shorter or longer time, produces considerable alteration in their brilliancy, and often entirely changes the colour. In order to obviate this inconvenience, the paint, after having been levigated, must be repeatedly washed in clean water: distilled water is the fittest; but the waters of many springs are sufficiently pure for this purpose. In order to effect this properly, put about half an ounce of the paint in a half-pint glass phial, and fill the rest of the phial almost entirely with water; shake it well; then let it stand for a while, and the coloured powder will soon fall to the bottom; then pour off the water, by inclining the phial gently, so as not to disturb the sediment, and fill it again with clean water, and so on for five or six times; after which, the colour being gently dried, must be ground a little longer, and then it is fit for use.

The glue or size to be mixed with the paints, is extracted from parchment in the following manner:—Take about four ounces of clean parchment, cut it into small bits, and put it to soak in a quart of clean water for about twelve hours; then boil the whole on a gentle fire, and in the beginning take off the scum with a spoon. The vessel must remain always uncovered, and the liquor must be stirred now and then. After boiling about an hour, take off the pot from the fire, and strain the liquor, whilst hot through a coarse sieve. The liquor must be put into a clean pot again over the fire, and boiled gently till half of it is evaporated; the remainder is then spread very thinly upon panes of glass, which being kept in a warm place for a day or two, the size will be dried, and will become very hard.

When it is wanted for use, put a small quantity of it in a cup of lukewarm water, and dip the hair pencil in it.

The properties of this glue, which render it much superior to gum-water, are the following: *It does not deaden or otherwise alter the colours* with which it is mixed. *It does not crack like gum*; and it becomes soon so hard, *as not only to defend* the colours from being affected by smoke and other vapours, but even to bear the surface of the drawing being cleansed by means of wet sponge.

WM. GALWARD.

Reading.

Lond. Mec. Mag

CIRCULATION OF AIR IN ROOMS.

To render the circulation of air sensible, let the air of a room be heated by a strong fire, while the air of a contiguous room is cold; then let the door between the two rooms be opened, in which case, the hot air of one room being lighter, will pass through the upper part of the opening of the door into the cold room, and, on the contrary the cold air of the other room being heavier, will pass into the former through the lower part of the opening; accordingly it will be found,

that by applying a lighted candle to the top, the middle, and the lower part of the opening between the rooms, a strong current of air will appear to pass from the hot into the cold room near the top; a contrary current of air will appear to pass from the latter into the former, near the lower part, whilst in the middle there is little or no motion at all, as may be clearly perceived by the flame of the candle It is for the same reason that when a fire is lighted in a chimney, a strong current of air is occasioned to enter the room which may be felt by applying the hand to the key hole, or other such small openings, if the doors and windows are shut; for the air over the fire being heated, becomes lighter, and ascends into the chimney; consequently other colder air must supply its place, which forces its way through all the small openings. Were a room with a fire in it to be perfectly closed, excepting the chimney, the air in it would soon become unwholesome for respiration, and the fire would soon be extinguished Hence it appears, that those persons mistake who expect to keep the air of a room sweet and wholesome, especially for invalids, by carefully stopping all the small apertures that admit fresh air. When the current of air that enters into a room falls immediately upon the persons who sit in the room, then it may be offensive, especially to delicate constitutions. In that case such openings should be closed, but at the same time another should be made in a more convenient part; for a circulation of air, particularly in rooms where a fire is kept, is not only salutary and usefel, but absolutely necessary.

ib.

PRIMITIVE COLOURS.

GENTLEMEN;—I am a painter by trade, and in the practice of my business I have frequent occasion to mix various shades and tints, and have often amused myself by compounding from what I have ever considered *primitive* colours, every variety of colour I could imagine. I know little or nothing of Newton's philosophy, and perhaps it is owing to this ignorance that I am at a loss to understand how there can be seven *primitive* colours. I have been accustomed to think there are only *three primitive* colours, and that all the rest are compounded of those three. For instance, were I to paint a raindow, I should take *red*, *blue* and *yellow*, each the brightest I could procure; and as I find the colours of the rainbow are arranged in the order of red, orange yellow, green, blue indigo, and violet. I should take my red for the first, mix it with yellow for the orane, pure yellow for the third, yellow mixed with blue for the green or fourth, pure blue for the fifth, the blue with the red for the sixth or dark colour, the same colour diluted for the seventh or violet; thus, out of my three colours I would by mixture produce the rest, which I would call *compound* colours, and not primitive; for it would be just as reasonable to call olive, drab, or brown, primitive colours, as orange, green, indigo and violet; for olive, drab, brown, and every shade of each of them, may be composed from red, yellow and blue; but these last cannot be produced by any combination of other colours.

From the above considerations I do not admit of the analogy between colours and musical tones; for tones in music will not admit of that infinite combination, as to the production of *new tones*, that colours will. Nor do the combination of two or more sounds compose a new tone, but if in chords, merely a combination of certain coincident vibrations, which, being differently combined, may produce a variety of harmony, but not of new tones.

BRUSH.

ib.

AEROSTATION.

SIR,—Merely as a suggestion, not being able to say practically I offer the following as an improvement in the art of aerostation. We know that to cause the descent of a balloon, the volume of gas must be decreased, which is done by suffering a

quantity to escape through the valve, and irrecoverably losing it; and to ascend again, the only means resorted to, is to lessen the burden on the balloon, by throwing out ballast, of which a plentiful supply must be taken; thus alternately losing *gas* and *ballast.*

Now, I propose a copper vessel containing, for instance, a cubic foot, and capable of resisting pressure from within, to be placed in the bottom of the car, and a compressing syringe or small forcing pump, as light as possible, attached to it, from which let an elastic gun tube (similar to that connected with the new stomach pump, but larger) be carried into the midst of the gas in the balloon, and suspended by strings from the upper part. My idea is, that by working this pump with a moderate force, the gas may be drawn from the balloon and compressed into the copper vessel; and if I am rightly informed, the portable gas lamps usually contain at least 30 volumes. If so, would not an equal decrease of volume be sufficient to cause a descent, and of its increase, by again admitting the gas restore the power of ascending? B. R.

Lond. Mec. Reg.

FRESH WATER.

As a means of preserving water at sea, an officer of the name of Ruyter recommends the use of a composition of resin and olive-oil well mixed with brick dust, to which he gives the consistence of varnish. He renders the resin adherent by mixing it with olive-oil, which unites itself with great facility to iron, with which it becomes perfectly combined when applied to it very hot. Its combination with the brick dust gives it a sufficient degree of solidity without altering its adherent quality. This plastering, when applied to the inside of the casks, is not liable to be dissolved by water, which on the contrary, increases its hardness, while it preserves the iron on the outside from being rusted. The author states, that he has employed this composition for several years on casks bound with iron hoops, which underwent no oxydization, and therefore rendered the use of pitch unnecessary.—*ib.*

MANUFACTURE OF BEET-ROOT SUGAR.

Sir,—The beet-root is first well scraped, and when perfectly clean, is placed in a wooden groove, about twelve inches long; at one end of which turns a broad wooden wheel, covered with short iron spikes; and on the opposite end of the groove is closely fitted a plug of wood, which is pushed by hand against the beet-root, the iron spiked wheel at the same time turning round, and gradually reducing it to a pulp. A trough placed immediately under receives the pulp, which is then mixed with quicklime, to destroy the acidity. The pulp is next boiled over a slow fire, never exceeding a certain heat. This last process is repeated two or three times, while an attendant skims off the impurities which rise at top. The pulp is, I believe, next separated from the saccharine juice by straining it in wire sieves; it is then put into large stone jars, and left in an airy place to cool. This produces the coarse brown sugar, which is afterwards refined by the usual process.

Lond. Mec. Mag.

ON BRICKMAKING,

BY JAMES ELMES, ESQ. M. R. I. A. *Architect.*

The art of Bricklaying or building with Bricks is of great antiquity, and appears to be coeval with the earliest buildings on record. Josephus relates that the children of Seth erected two pillars, one of brick and the other of stone, on which they engraved the principles of astronomy. The walls of Babylon, which are attributed by Herodotus to Semiramis, and a pyramid in Egypt, described by the same author, were built with Bricks, which were a common and durable material among all nations of antiquity. Pausanias mentions several temples and other structures

built with Bricks, in various parts of Greece; and Rome we know abounds with many large and splendid edifices thus constructed

The art of making Bricks for building has been variously practised among different nations The Bricks of the ancients differed from ours, inasmuch as they were dried in the sun, instead of being burnt or baked by fire, and were mixed with chopped straw to give them a tenacity of substance. Brickmaking, we are informed in sacred history was one of the laborious indignities by which the Israelites were oppressed during their bondage in Egypt.

The ancient Babylonians often impressed or engraved inscriptions on their Bricks, in a character which has given rise to much discussion among the learned Specimens of them may be seen in the Archæological department of the British museum, in the Museum of the East India Company, and in the library of Trinity College, Cambridge.

The ancient Greeks chiefly used three kinds of Bricks, the Δίδωρον, bricks of two or three palms in length; Τετράδωρον, those of four palms; and the Πεντάδωρον, those of five palms

The Romans, from a comparative deficiency of marble, built more with Bricks than the Greeks, and employed the arch and the vault, to which this useful material so much contributed, more than their predecessors Their perfection in this art may be dated from the decline of the Republic, and during the splendid times of the Cæsars. The Bricks most in use among the Romans, according to the authority of Pliny, and those discovered in various parts of England, were about seventeen inches long, and eleven broad, (English measure,) and scarcely thicker than our paving bricks. Palladio, Sir Christopher Wren, and other eminent modern architects, have constructed beautiful and well proportioned edifices in brick.

Bricks, as manufactured in England, are always burned or baked. Unburnt Bricks, after the ancient mode, are still in use in Egypt, and many parts of the East. The modes of making bricks in this country are various: those manufactured in the country, differ from those made in the neighbourhood of the metropolis, and are distinguished by their colour; the former being a deep red, and the latter, a yellow stone colour, and gray. The country Bricks, which are baked in a kiln are made of a stronger earth, and have no internal firing; but the London method is beginning to be adopted in all large towns, both in England and in Ireland, where cinders and coal ashes can be procured, and by far the greatest quantity of Bricks are made in that manner. The following is a description of the best method of making Bricks, with all the improvements that have been introduced within the last few years.

The earth most proper for making the country or kiln-burnt Brick, which, from containing ferruginous particles, always burn red, is a stiff clay, which is tempered alone, formed in moulds, dried in the air and sun, and baked in a kiln like pottery. These sort of Bricks are hard and red, sometimes with dark gray or black ends, which, as often seen in our villages, the country bricklayers dispose in various figures of dates, chequer work, and similar forms. They are unfit for cutting and rubbing for gauged work, which is always performed with a milder sort, called *red rubbers*.

The earth selected as the most fit for making common Bricks after the London mode is a clayey loam; and that for the superior sort, such as those which are used for facing buildings, called *malm stock* Bricks is a lighter sort of loam, in which marl is found, frequently met with from two to three feet below the clayey loam. By the modern improvement, of mixing chalk with the earth, as in the neighbourhood of London, and seacoze or sludge, as on the coasts of Sussex, Suffolk, and other maritime districts, a *sandy* loam can be made into good Bricks; but a strong or stiff clay, such as will do for the kiln burnt Bricks, is the most improper of

any which can be chosen for this purpose.

The earth, of whatever quality it may be, should be dug in the autumn. The workmen are to be employed during the winter in preparing the earth for the ensuing season. This is done by removing the vegetable mould from the surface, which is called *uncallowing*, and placing coal ashes in proportion of two inches in thickness to every foot deep of earth, which is twelve chaldron of coal ashes, or bereze as it is called, to every hundred thousand of Bricks, and mixing them together in digging the earth; because the composition is improved in proportion as it is exposed and acted upon by the frost, rain and wind. The mixture is then generally turned over once after it has been dug, but is seldom suffered to remain in this state of preparation longer than one winter before it is used, as it would be inconvenient to the manufacturer from the space it thus occupies; and is considered not to improve the earth so much as it deteriorates the combustible qualities of the ashes.

When the prepared soil has thus endured a winter's preparation, it is delivered over about Lady-day to the charge of the brickmaker or *moulder*, as he is called; and the first thing to do in the formation of sound Bricks, is tempering the earth This was formerly done by a gang of six persons, employed and paid by the moulder, who makes them from the heap till laid on the hack to dry by the thousand; and an active, industrious, skilful man can, with these assistants, who are often his wife and children, mould from six to seven thousand in a day, calculating from five o'clock in the morning till eight at night One of this gang tempered and prepared the earth with a long hoe, by which he pulled it from the heap; a shovel, with which he chopped it backwards and forwards, turning it as often as he found it necessary, incorporating the ashes, sand, and earth thoroughly together; and a wooden scoop, with which he threw water over the mass in preparation, to bring it to a more ductile state. The great difficulty of having this operation, on which so much of the success of the manufacture depends, well performed, has occasioned the introduction into extensive works of machines called *pug mills*, into which the prepared earth is wheeled after it is mixed with a proper quantity of water. Care should be taken, whether the tempering be done by men or the mill, that too much water be not used, as the more solid the Brick is delivered from the mould, the better it retains its form on the hack where it is set to dry, the less it shrinks in drying, the sooner it dries, and the better and more shapeable it burns.

When the mass is sufficiently mixed, by either of the above modes, it is laid in small parcels, well kneaded on the moulding table, which is covered with dry sand. The moulder throws it smartly into the mould, presses it down to fill all the cavity, and strikes off the overplus with a stick He then turns the newly formed Brick from the mould onto a thin board, larger than the Brick which is removed by a boy to a light latticed wheel barrow, and is thus conveyed, covered slightly with fine dry sand, to the hacks to dry. The Bricks are arranged on the hacks with great regularity one above the other, a little diagonally, in order to give a free passage to the air.

When the bricks are sufficiently dried in the hack, which in fine weather may be in about nine or ten days, they are ready for the fire, which completes the operation. It is of the greatest consequence to the quality of the Bricks, that they should be thoroughly dry before they are set in the clamp, which can only be ascertained by breaking a few in halves, selected from various parts of the hack. If the operation of drying in the hack be not thoroughly performed, the Bricks will never burn sound; and the moisture which ascends from them in the form of vapour, renders the upper courses of the clamp peculiarly unsound.

The clamps are generally of an oblong form, and contain from one hun-

dred thousand to half a million of Bricks. The cinders by which they are burned, are placed in two or three layers, between single courses of Bricks, on a foundation formed of three courses of *place*, or half burned Bricks from another kiln, or the driest of those about to be burned In these lower courses, there are generally three apertures left running across and through the clamp, which contain faggots and coals, for the purpose of setting it on fire.

In about twenty days, or if properly fueled and constructed, when the fire is all burned out, the bricks are fit for use. Those of the interior of the clamp should be hard, square, and of a bright good colour. These are the stock Bricks of the London market.

The preparations of the loam, marl, ooze, chalk, &c with which the beautiful yellow *malm stock* of London, and the Bricks of the Ipswich sort are made, requires more attention, and a longer and more careful process. The clay and other ingredients of which the soil for *malm Bricks* are composed, are wheeled into a mill with a due proportion of water. This composition is then ground in the mill, which is supplied with two sets of knives and harrows, and runs out in a state of thick mud or sludge through wooden spouts, into hacks which are raised near the mill. It is there left, till by the water soaking away and by absorption, it acquires a sufficient consistency or solidity to be kneaded for the moulder. The moulding, drying on the hacks, and burning in the clamps, is performed exactly as before described for common stocks, but with more care and precaution.

As marl is not always to be found where *malm stock* Bricks are required, the method used by Mr. Lee, of Lewisham, is so good a substitute, that it is worthy the attention of builders, who may wish to manufacture these beautiful Bricks without marl. After many experiments occasioned by the paucity of marl in the London districts, Mr. Lee discovered that chalk, mixed in certain proportions with the loam, and treated in the usual manner, produced an excellent substitute. For this discovery, he took out a patent, which having now expired, this mode of mixing a small quantity of chalk with the Brick earth, is generally adopted around London, for the purpose of giving colour and soundness to the Brick At Emsworth, in Hampshire and at Southampton, ooze or sludge from the sea shore, which contains much saline matter, is used for a similar purpose ; but however sound these bricks are, they have neither the rich brimstone colour of the London *malm stock*, nor the regular stone coloured creamy hue of the Ipswich Bricks.

Bricks, like most other useful articles in this country, are subject to a duty, and form an important part of the annual revenue of the government. They are also subject to a regulation as to size By the 17th Geo. III. cap. 42, all Bricks made for sale, shall, when burned, be not less than eight and a half inches long, four wide, and two and a half thick: and by 43 Geo III cap. 69, which consolidates the excise duties, every thousand Bricks made in Great Britain, not exceeding ten inches long, three inches thick and five inches wide, are liable to a duty of five shillings; and exceeding these dimensions to ten shillings.

The principal Bricks used in the United Kingdom, are *stock* and *place* Bricks, from the *stock* Brick clamp; *malm stocks*, *cutters*, *seconds* and *pavers*, from the *malm* clamp. *Red stocks*, *paving Bricks*, *fire Bricks*, *foot and ten inch tiles*, from strong clay, and burned in a kiln. Of the *fire Bricks*, the best are from Windsor, Stourbridge, Wales, and some of the iron counties, The Welch are excellent, and will stand extreme heat; they are made of large sizes for the boilers of sugar houses, brewers' coppers, &c. and are called Welch lumps. Patents have been granted, and descriptions published of Bricks of various and fantastic shapes, which not having gained general use, are not here noticed.—*Enc. Met.*

CHARCOAL.

An apparatus, called Charbonniere, has been invented by M Mollerat, in France. This apparatus is so constructed as to extract the greatest possible quantity of charcoal from the combustible to which it is applied. In the carbonization of wood, 30 parts only in a hundred are fixed and produce charcoal, 15 parts are converted into gas, 20 parts consist of water in a state of evaporation, 20 of pyroligneous acid, and 15 of vegetable oil, which require no less than 250 degrees of heat to make it evaporate.—*Lond. Mec. Reg.*

PRESERVATION OF MARBLE.

A wash for the preservation of Marble has been recently invented by Messrs. Garnier and Co. of Paris, which is already very generally adopted in that capital. It secures purity and solidity of the marble from the attacks of moisture and of saltpetre, and is calculated to become a cheap and useful substitute for paper hangings and paint, being as well suited for the interior. It is as white as marble, and also capable of receiving fresco paintings. The ancients are said to have used something of this description, as many of the buildings in Pompeii were found covered with a thin white coat; and if such an invention was necessary in such a climate as that of Italy, it is doubly so in such a latitude as Paris.

Lond. Mec. Mag

ARCADE.

Among the improvements that are projecting in Philadelphia, is an Arcade. This buiding is to be one hundred feet wide, and 150 feet long. It will front on Chesnut-street, and extend to Carpenter-street, and will contain under the same roof or arches, ninety stores. The fronts are to be of marble, the one on Chesnut-street highly ornamented, and every room is to be fire proof. It is calculated to cost $ 150,000, and is proposed to be built by a company, who subscribe to the stock which is divided into shares of $100 each. The model, by Mr. John Haviland, professor of architecture to the Franklin Institute, is said to be the most elegant thing of the kind that has ever been exhibited in the United States. Between 70 and 75,000 dollars have been subscribed.

RECTIFYING SPIRITS.

Mr. Knapp, of Newtown, Tioga county, N. Y. has recently obtained letters patent for an improvement in the mode of rectifying spirits. It consists in causing the alcoholic vapour to pass through recently made charcoal, reduced to a powder, previous to its entering the condensing apparatus. The process is said to remove, completely, the empyreuma and bad flavour of the liquor and it appears reasonable, that it should prove a more effectual detergent than the modes heretofore practised.

SIR,—If the following extracts and calculations are worthy a place in your Magazine, please insert them and oblige

A SUBSCRIBER.

A piston, four feet in diameter, has a circumference of 150.7968 inches nearly, and an area of 1809.5616 inches, which area, under a pressure of 150 lbs to the inch, affords power of 121.17 tons.

A wheel, 16 feet in diameter, and whose shaft is one foot in diameter, and is propelled by a power of 120 tons, will exert a force equal to 7½ tons, at its periphery; and a similar wheel, propelled by a force of 16 800 lbs at the shaft, will exercise a power at its circumference, of 2000 lbs. or a 14 horse power: and if these wheels be geared so as to move together, one revolution of the shaft, where the force of 120 tons acts, would give 256 revolutions to the third shaft, so that if the first shaft be 3 minutes in performing one revolution, the third shaft will give 85⅓ revolutions in the same space of time. And if the rack work which turns the first shaft, be twelve feet long, the shaft of the machinery will be

twelve minutes in ascending, and twelve in descending.

EGYPTIAN ORE.

SIR,—I should feel much obliged to any of your numerous readers and correspondents who would favour me with his candid and unprejudiced opinion upon a metal sold by Mr. M'Phail, and manufactured into various articles of jewellery, under the name of "Egyptian Ore," and if it really answers the description given of it by the inventor. As, firstly, whether it will wear equal to, and retain an appearance of gold? and, lastly, whether any person who is at all a judge of gold, can, upon a superficial inspection, and without submitting it to the usual test, detect it as being only an imitation of that metal.

I am, Sir, yours truly,

QUIBUS.

Lond. Mec. Mag.

LEVEL OF THE SEA.

It is proved by many observations, that the level of the sea must have been, at some ancient period, higher than it is at present This can be easily accounted for, if we consider that water heated must be more expanded than the solid earth. If we suppose, with M. de la Place, that the average depth of the sea is 96,000 feet, and assume he dilatation of the earth to be equal to that of glass, we find, that at a temperature of 100 centigrade, the sea would be 4000 feet higher than it is at present, and that it would cover most of the secondary mountains. The melted masses shrink during their cooling. If this happens in large masses, cavities, garnished with crystals, must result, and other singular phenomena.

ib.

IMPROVEMENT ON UMBRELLA RINGS.

SIR,—Having often seen others, as well as myself, inconvenienced (at the very worst time too) in sliding up the ring of an umbrella, by the tape to which the ring is fastened winding or coiling around it, I always make the ring for my own with a little swell on one side, and pierce the same as the eye of a tape-bodkin, and then secure the end of the tape in it Not only is the inconvenience of which I have spoken thus remedied, but both the tape and umbrella covering are saved from being so much worn by the sliding of the ring up and down. This is a very simple thing yet I never saw it adopted by any one but myself. Perhaps you will think it deserving of being more generally known.

I am, Sir, yours, &c.

C. M.

ib.

ORDERS OF ARCHITECTURE.

SIR,—Although the Composite or Roman Order partakes of the Ionic and Corinthian, and is certainly not so elegant as the latter, yet it has been thought by many to have been used indiscriminately with the Corinthian, in order upon order This opinion carries some force with it, since the *cornice is always Corinthian.* There are much greater discrepancies than the above, to be found in the works of the ancients, (even supposing the Composite to be of a more massive nature than the Corinthian.) In the Coliseum the same order is repeated; and there are some instances where the intermediate order is altogether omitted, "and the Ionic placed upon the Tuscan, or the Corinthian upon the Doric." How far this may agree with good taste, I will not venture to say, leaving it to every person to form his own opinion. The Composite is generally composed from the frontispiece of Nero (Corinthian,) and the Temple of Concord (Ionic.) Vitruvius, in the first chapter of his fifth book, says, that "the columns in the second story should be less than those in the first by a quarter: for the inferior part being more loaded, ought to be the strongest;"

The reason why the Composite Order is generally placed over the Corinthian, is, that the *Composite*

Order is much more light and slender in its proportions (as in the best examples, the arch of Titus, at Rome, and others.) and also more full of embellishments.

Its composition from which it derives one of its names is in the capital only; the superior, or upper part, having the two large volutes of the Ionic, and the lower the leaves of the Corinthian.

ib.

VARNISHING COACH BODIES.

SIR,—I was much gratified in perusing the Mechanics' Magazine, and finding a communication on the subject of varnishing and polishing, by the Italian Cabinet makers.—Please to inform me what process is used, in the varnishing and polishing of coach bodies, and you will oblige one interested.

A SUBSCRIBER.

Brooklyn, Oct. 14, 1825.

N B What varnishes are best for the above purposes, and how are they made?

PERPETUAL MOTION.

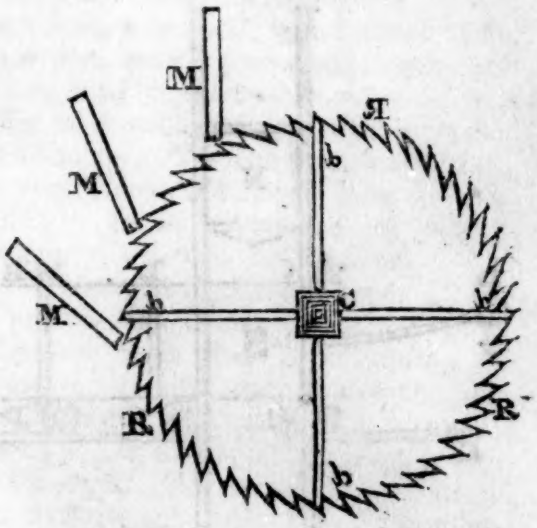
Let those laugh now, who never laugh'd before;
Let those who ever laugh'd, now laugh the more.

SIR.—I am aware, and therefore anticipate from you at least a laugh, upon receiving a communication on this subject; but if your risible faculties can be composed, I would then invite a few serious moments

You will agree with me that the universe is a display of perpetual motion, and that such a thing does, beyond all doubt, exist. The co-operation and nice combination of what or how many various causes (each perhaps governed by different laws, and opposite in their effects) which produce this perpetual motion it might be presumptuous to endeavour to ascertain; suffice it to know, that all concur in a most wonderful manner to exhibit what man is striving to discover, and hitherto in vain.

I coincide in opinion with those who consider there are insurmountable difficulties to the discovery of perpetual motion, by any machinery wholly subservient to the laws of gravity and the mechanical powers; and as the perpetual motion of the universe is not effected under the laws of gravity only, there appears but little probability of man's discovering it by such machinery.

By consulting Nature's laws generally, success is more likely to follow; and, indeed, an invisible (but well known) agency is available for the purpose. I have, therefore, resorted to an auxiliary, that operates wholly independent of, and in opposition to gravity, to effect perpetual motion; with what success you will see.



Description.

The above drawing represents a wheel of one foot in diameter, revolving on its centre C. Its circumference, RRR, is a thin steel hoop, or rim, three quarters of an inch broad, formed in the indented manner delineated, and connected to the centre by two bars, *bbbb*. (The thin edge of the rim presents itself to view.)

MMM are three magnets fixed, totally unconnected with the wheel; their poles are placed as close as possible to its rim, but not to touch it, to impede its going round. These three magnets are so disposed as alternately to exert their full attractive powers, at right angles, on the flat indented surfaces of the steel rim of the wheel; and as it moves round, the attraction of one magnet does not cease its operation until another magnet exerts its full power.

The weight of the wheel on the side

next the magnets being thus continually lifted, or made lighter, by the attraction of the magnets, causes the weight on the opposite side of the wheel to preponderate on its centre, and the wheel to revolve, and to continue a perpetual rotatory motion—at least, as long as the magnets retain their attracting power.

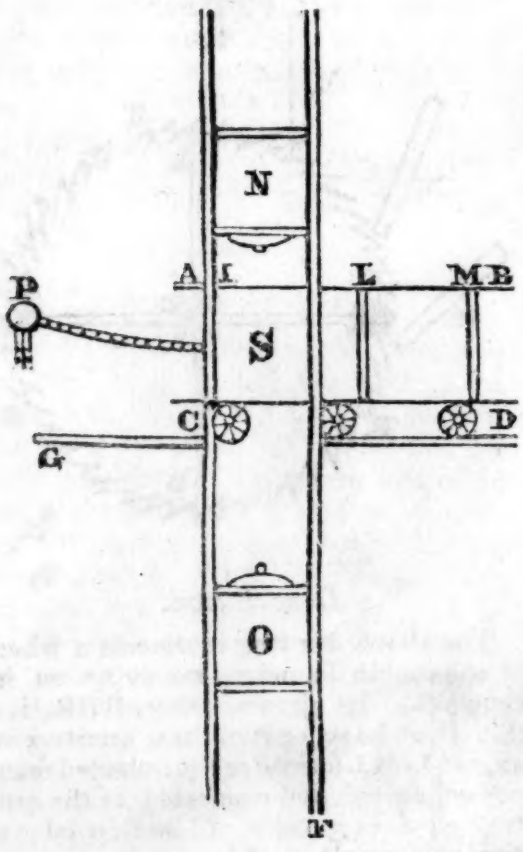
By inserting the foregoing in your useful publication, you will oblige,

Sir, your humble servant,
and constant reader,
NRUBKCALB CAASI.*

Ware, Herts.

Lond. Mec. Mag.

PLAN FOR SHIFTING CARRIAGES ON RAILWAYS.



SIR,—In all extensive rail or tram roads, where much work is doing in both directions, to prevent the inconvenience of two wagons meeting, a long curvature in the road must be applied to give a passage, which must considerably increase the expense of construction. The plan I here propose to be laid down, I think will be deemed worthy of application, as it will be attended with considerably less expense, and may be applied in an elevated place with the same facility as it can be on a horizontal.

Description of the Drawing.

Let S be the appointed station for the wagons to pass each other, and ABCD a long wagon, placed on six wheels, running at right angles with the general railway, EF, on a piece of railway, GH, below; and across the wagon ABCD, there must be laid two pieces of railway, IK and LM, somewhat longer than the wagons, N or O, and at a convenient distance from each other, to correspond exactly with the general rail; so that, by running the wagon N, on the rail IK, and then with a winch, P, placed at one end, drawing the wagon ABCD, far enough to bring the other piece, LM, into the general line, the other wagon, O, may pass on without interruption; and again, by returning the wagon, ABCD, to its first position, the wagon, N, may pass on, and the wagon, ABCD, be ready to act in the same manner when necessary. The rail, LM, might also be constructed as a revolving table, and serve to continue the road in any other direction, without any connecting branches.

A. B.

ib.

EXTINGUISHING FIRE ON BOARD SHIPS.

SIR,—From the many accidents of ships taking fire at sea, and these commencing in parts of the vessels not easily got at, it appears to me that a reservoir on deck, with pipes either of leather or lead, communicating and opening into various store rooms, such as the spirit-room, powder-room, &c. would be the means of procuring an instantaneous application of water. The mouths of the different pipes should be marked, so that only that which led to the part on fire should be opened. In my opinion this arrangement would give passengers and all on board a very great assurance of safety; and I have no doubt the expense of it would be compensated by the allowance the Insurance Offices would make in favour of such ships.

I am, Sir,
Your obedient servant,
J——B——.

ib.

* Read the signature from right to left.

PRACTICAL DIRECTIONS FOR THE CONSTRUCTION OF BAROMETERS.

It appears from many experiments, that the quicksilver stands higher in tubes of larger than in those of smaller bore; and, therefore, when observations are made with different barometers, some regard should be paid to the difference of their diameters; and it would be desirable to have them constructed of tubes of the same interior dimensions. The tubes should be pretty large, in order to prevent the effects of cohesion or capillary attraction: they ought, for example, to be not less than one-fourth of an inch in diameter, and if they are one-third of an inch, they would be the better. Moreover, if a cistern be used instead of the leathern bag, its surface ought to be larger in comparison with the area of the section of the tube, in order that the addition or substraction of the quicksilver contained between the greatest and the least he ghts may not sensibly affect its depth. The tube should be preserved free from dust till it is used, and for this purpose it may be hermetically sealed at both ends, and one end may be opened with a file when it is to be filled. If this precaution has not been observed the inside should be well cleaned, by washing it with spirits of wine, highly rectified, and by rubbing it with a little piston of shamoy leather, fastened to a wire.

The quicksilver should also be very pure; it may be purged of its air by previously boiling it in an earthen pipkin, closely covered. When the tube has been uniformly heated throughout, and rendered electrical by rubbing, the hot quicksilver should be poured into it, in a regular current, through a glass funnel, with a long capillary tube, so that the air may not have room to pass between the parts of the quicksilver. De Luc reccommends that the quicksilver should be boiled in the tube, as the most effectual method of purifying it of its air and moisture.

The process is briefly this:—choose a tube of about a quarter of an inch in diameter, and not exceeding half a line in thickness; fill this within two inches of the top with quicksilver, and hold it with its sealed end over a chafing dish of burning charcoal, presenting first the sealed end to the fire, and then moving the whole obliquely over the dish. As the quicksilver is heated, the air bubbles appear like so many studs on the inner surface of the tube, which gradually run one into another, and ascend towards the higher parts of it which are not heated. Here they are condensed, and almost disappear, but after successive displacements, they at length accumulate in one place, and acquire a bulk by their union, which enables them to escape.

In performing this operation, it will be found, when the quicksilver boils, that the parts strike against each other, and against the sides of the tube with such violence, that a person unaccustomed to the practice is ready to apprehend that their force is sufficient to break the tube, of which, however, there is no danger. The quicksilver is thus freed from all heterogenous particles contained in it, together with their surrounding atmospheres; and the air which lines the inside of the tube, which cannot be expelled in any other way, is thus discharged. When this last mentioned stratum of air is thus expelled, the tube may afterwards be emptied and filled with cold quicksilver, and it will be found nearly as free from air as before.

The quicksilver in tubes thus prepared will, by a certain quantity of heat rise higher than in those made in the common way; and different instruments thus made will agree better with each other. In common barometers, in which this process has not been observed, there will frequently be found a difference of several lines, at the same time, and in the same situation.

De Luc found that barometers made in the way we have described rose uniformly in a heated room; while the quicksilver in those that had been prepared in the common way descended, and in different proportions. When the room was suffered to cool, the former descended uniformly as they had risen while the latter ascend-

ed irregularly as before; and frequently, at the end of the experiment, they did not agree with each other as they did before it. The reason is obvious,—it proceeds from the effects of heat on the air, remaining in unequal quantities in the tubes in the one case, and on the purer quicksilver in the other. Another circumstance also requiring to be attended to in the construction of these instruments, is the temperature of the air; for unless this remains the same the immersion of a given quantity of quicksilver will be variable, and its attitude an uncertain measure of the barometrical pressure.

Lond. Mec. Jour.

PERPETUAL MOTION CLOCKS.

We never like to detract from the merit of a man who introduces to the public improvements on any subject of science or mechanism, but it becomes a duty to interfere when we see a plagiarism palmed upon the world as an original invention For the last few years there has been exhibited in the window of a watch-maker near the Royal Exchange, a clock which is wound up and continued in motion upon the balance system, by balls running backwards and forwards, and truly we believe a patent has been taken out for this very new principle What will our readers say when we inform them, that in a book upon mechanism, published at Rome in the year 1651, there is this invention, with a plate describing as accurately as possible, the clock which an Englishman has introduced in the nineteenth century as original.

Lon. Mec. Reg

PLATE POWDER.

In most of the articles sold as plate powder, there is an injurious mixture of quicksilver, which is said in some instances to so far penetrate and render silver brittle, that it will even break with a fall. Whiting, properly purified from sand, applied wet, and till dry, is one of the easiest, safest, and certainly the cheapest of all plate-powder. Jewellers, for small articles, seldom use any thing else If, however, the plate be boiled a little in water, with an ounce of calcined hartshorn to about three pints of water, then drained over the vessel in which it was boiled, and afterwards dried by the fire, while some soft linnen rags are boiled in the liquid till they have wholly imbibed it, these rags will not only when dry, assist to clean the plate, (which must afterwards be rubbed bright with leather) but also serve admirably for cleansing brass locks, finger-plates, &c. *ib.*

AN UNALTERABLE WHITE FOR WATER PAINTING.

Dissolve four ounces of Roman alum in as small a quantity of hot water as is barely sufficient, and then mix it with two ounces, or two ounces and a half of honey. Set this mixture to evaporate to dryness in an earthen vessel, over a gentle fire. It will then appear like a spongy sort of coal, which being removed from the fire, must be pounded, and the powder placed in shallow crucibles or cuppels, so that it may lie very thinly on them. Expose these to a strong *red heat* for an hour. After this the powder must be pounded again, and being replaced in the cuppels, it must be exposed anew to a strong red heat, and to a free current of air for an hour longer. Being then removed from the fire, it is reduced upon a porphyry to an exceedingly fine powder of an intense whiteness. It may be mixed with gum water, in the same manner as other paints are usually treated; and is not apt, like white-lead, to turn to a dusty hue.

WM GATWARD.

Lond. Mec. Mag.

HOTTENTOT MODE OF TANNING.

HOTTENTOTS near the Cape form their tanning vats of the skin of some quadruped. The one which Mr Burchell observed was the skin of a zebra supported by four stakes on a frame, to which its edges were bound by thongs, in such a manner that the middle, hanging down, formed a ca-

pacious basin. It was filled with a liquid, in which they lay a quantity of bark of the *karrothorn* (a species of acacia,) and together with it a number of sheep skins, first deprived of their hair, were placed to steep The acacia bark possesses a large portion of the tanning principle, and imparts a reddish colour to the leather; but in other districts, several sorts of bark, as of a kind of fig, are applied to the same purpose, and also a kind of mesembryanthemum

The sheep leather, thus tanned, is made use of in the distant and more unfrequented part of the colony, for various parts of clothing, by the Hottentots and the poorer class of colonists; but for the making of trowsers it is every where in general demand. Men's jackets, and even women's gowns and petticoats, are made of it by those who are unable to buy woollen and linen clothing Such dresses were, before the English had possession of the land, the common costume of the peasantry and Hottentots, but since that time the prosperity and riches of the country have increased so much, that by far the greater part of the colonists can now afford to wear a dress entirely of English manufacture.

Lond. Mec. Jour.

WATCH KEYS.

SIR,—The change in the shape of Watch Keys was not occasioned for mere fashion alone, but for the convenience of wearing. The old shape was so crooked as to be inconviently liable to catch ladies' gowns in dancing, or when at any time assisting them; and by the entanglement, in very many mechanical operations, it caused the watch to be jerked entirely out of the fob, more particularly before braces or suspenders were used, which was about the same time that the form of the watch keys was changed. In riding, especially in leaning forward to open a gate, the key, from its many angular shapes (somewhat as crooked as the Isle of Man arms,) often got fixed under the pommel of the saddle and on rising, the watch was drawn out suddenly, or the chain broke.

The present form is doubtless the most convenient for *wearing*, though certainly not for *winding*; but as the wearing is for twelve hours or more, and the winding for less than half a minute custom has naturally, in my opinion, given rise to the present shape

A triple-jointed steel key was invented to remedy the inconveniences of both the above-mentioned, which, when suspended and at liberty, was in a vertical posture but on application it was of the old shape. Gold or copper, however, is not strong enough for joints so small, and a steel key does not harmonize well with gold seals and chains, or even gilt ones, though this kind is now much in use with the lower classes in the country, particularly ploughmen and carters, mostly accompanying a steel chain.

AGRICOLA.

Lond. Mec. Mag.

ON GRINDING GLASSES FOR SPECTACLES AND OPTICAL INSTRUMENTS.

The first thing is to fix upon the proper aperture, or breadth, and focal distance of the glass: a piece of sheet copper is then taken, and with compasses opened to the focal distance, supposing the glass is intended to be convex on both sides, and two arches, each a little larger than the intended breadth of the glass, are then struck; but if the glass is to be flat on one side, the compasses are only to be opened to half the distance of the focus,

The copper is then filed away from the outside of one of these arches, and from the inside of the other, by which means two guages are formed, the one convex and the other concave.

Two circular plates of brass, half an inch broader than the intended glasses, and about a tenth of an inch in thickness, are then taken, and these plates are soldered upon a cylinder of lead of the same diameter, about an inch high. One of these tools as they are called, is fixed upon a turning lathe, and turned so as to correspond with one of the guages; and the other to correspond with the other guage. The two tools are then

to be ground together with the finest flour emery, until the surfaces exactly coincide. If the focal distance is very short, the plates, before they are soldered upon the lead, should be hammered as truly as they can be done, into the proper form.

If the lens is not for achromatic instruments, glass of a straw colour, whose dispersive power is as small as possible, is chosen, which has the two surfaces parallel; and, by means of scissors or pincers, it is cut into a circle, the edge smoothed by a common grindstone, and it is fixed by means of pitch to a wooden handle of less diameter than the glass, and about an inch high, so that the centre of the handle may exactly coincide with the centre of the glass. If the intended focal distance is very small, the surface of the glass is ground on the grindstone, so as to suit the gauge as far as possible.

The glass being thus prepared, and supposing the lens intended to be convex, which is the most common form, it is then ground with fine emery upon the concave tool, which is to be firmly fixed to a table or bench, and the glass wrought upon it with circular strokes, so that its centre may never pass beyond the edges of the tool. After every circular turn, two or three cross turns along the diameter of the tool, in different directions, are given.

When the glass has got into its proper shape, and touches the tool in every part of its surface, which may be easily known by inspection, the emery is to be washed away, and finer kinds substituted, until all the scratches and roughness are worn down. Those that remain after the finest emery has been used, are taken away, and even a slight polish given to the glass, by grinding it with pounded pumice stone. During all this operation of grinding, the convex tool, at the end of every five minutes, is ground for a few seconds upon the concave tool, in order to preserve the proper curvature. The glass is then separated from the handle by a knife, the pitch removed by rubbing it with a little oil, the already ground side fixed upon the handle, and the other side ground and finished in the same manner.

To form concave glasses, the convex tool is used in the same manner as the concave tool is used for convex glasses.

Some persons, for concave glasses, use leaden wheels, having the same radius as the curvature of the glass, and with their circumference of the same convexity as the glass is to be concave. These wheels being fixed upon a lathe the glass is held steadily in the hand, and ground upon them with emery. For common purposes, convex glasses are ground by fixing the concave tool upon the lathe, and applying in the same manner the glass to it. But this manner of grinding will not do for glasses when they are to be employed in the best kind of optical instruments.

The mode of polishing the glasses thus ground will be given in a succeeding Number.

Lond. Mec. Jour.

To the Subscribers and Patrons of the AMERICAN MECHANICS' MAGAZINE we have now the pleasure to state, that the work will continue to be published regularly every Saturday. Means have been taken to make the work more generally useful and interesting to the Mechanic, Manufacturer and Agriculturist, and we hesitate not to say, that it will contain the latest improvements and discoveries of our own, as well as of foreign countries. We cannot but take this opportunity of informing those who may wish to lay their projects and inventions before the public, that we will at all times use our exertions cheerfully to forward their views, in the hope that the public may reap the benefit with the least possible delay. The unparallel success that has hitherto attended this publication, notwithstanding the many difficulties it has had to contend with, leads us to hope that, by redoubling our exertions, and increasing our means to obtain the most interesting and valuable information, we shall be powerfully sustained by that public who know so well that "knowledge is power."

☞ *Communications for the American Mechanics' Magazine, post paid, and addressed to C. S. WILLIAMS, No. 252 Broadway, will receive due attention.*